

BRAZILIAN PARASITOIDS OF GALL-FORMING INSECTS: TWO NEW CHALCIDOID SPECIES AND HOST RECORDS¹

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ABSTRACT: The geographical distribution as well as new host for *Lochitoencyrtus gahani* (Encyrtidae) are recorded. Two new species of neotropical Chalcidoidea parasitoids of Brazilian insect gall formers are described: *Syrphophagus cecidium* (Encyrtidae) and *Eurytoma minasensis* (Eurytomidae). Brief information on the host insect and their galls is given for each species of parasitoid.

The number of insect herbivores associated with different plant taxa has been widely studied (e.g. Lawton & Schroder 1977, Lawton & Price 1979, Kennedy & Southwood 1984, Strong *et al.* 1984, Fernandes & Price 1988). Hawkins & Lawton (1987) recently studied the variation in species richness of British parasitoid insects and their phytophagous insect hosts. Studies on the richness (e.g. Price 1980, Hawkins & Lawton 1987), abundance, degree of specialization and generalization of parasitoids on their hosts are very important to understand the diversity of fauna and flora.

One of the hypotheses reviewed by Price *et al.* (1986, 1987) on the adaptive significance of insect galls stated that gall formation could be an important adaptation for defense against insect parasitoids. The knowledge of the composition, structure, and richness of the gall-forming insect parasitoid fauna will help understand the ecological mechanisms and the evolutionary processes involved in the formation and diversification of insect galls.

Despite the diversity of the flora and fauna of the neotropical region, there are few studies on the neotropical gall-forming insects (Fernandes & Martins 1985, Fernandes 1986), and even fewer on the gall-forming parasitoids (but see Fernandes *et al.* 1987, Winder 1980). This study is a small portion of a long term study on the insect gall fauna of Brazil (see Fernandes *et al.* 1988) which not only aims to survey the Brazilian insect galling fauna but also to observe its distribution, occurrence, and evolutionary ecology. Here, we report on the taxonomy of three neotropical chalcidoid parasitoids of gall-forming insects and their host plants.

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We give new data on the biology and geographical distribution of *Lochitoencyrtus gahani* (Encyrtidae: Hymenoptera) a parasitoid of *Neolithus fasciatus* (Psyllidae: Homoptera) which induce leaf galls on *Sapium biglandulosum* (Euphorbiaceae); and describe two new species of chalcidoidea of gall-forming insects: *Syrphophagus cecidium* (Encyrtidae: Hymenoptera) a parasitoid of *Trioza* sp. (Psyllidae: Homoptera) which form leaf galls on *Myrcia itambensis* (Myrtaceae), and *Eurytoma minasensis* (Eurytomidae: Hymenoptera) a parasitoid of *Anadiplosis* sp. (Cecidomyiidae: Diptera) which form leaf-rachis galls on *Machaerium aculeatum* (Leguminosae).

MATERIAL AND METHODS

All host plants and their gall-forming insects studied here were present on a secondary "cerrado" vegetation at the Campus of the Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil (for further details see Fernandes *et al.* 1988, Ferrari 1977). Fresh galls were brought into the laboratory, where they were opened carefully by peeling away the outer layers of gall tissue. Adult gall-forming insects were point mounted while fresh to preserve their natural colors; parasitoids and all immature insect stages were preserved in 70% alcohol. As a standard procedure (see De Santis 1964), when there was only one specimen, all the measurements were taken from the holotype specimen. When there were more than one specimen, the description was made based on the holotype, and the measurements taken from a paratype. We made a sub-section entitled "variations" to indicate those characters with significant variation (for an example see the description of *E. minasensis*). The insect parasitoid types described here are in the collection of the Museo de La Plata, Paseo del Bosque, La Plata, Argentina.

RESULTS AND DISCUSSION

Encyrtidae

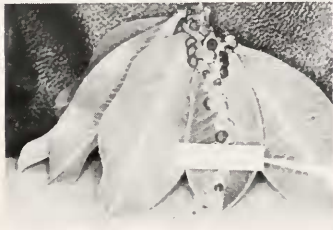
Lochitoencyrtus gahani De Santis (1964)

This species was previously described by De Santis (1964: 265) in his work on the encyrtids of Argentina. Previous geographic distributional records for this species are from Argentina and Trinidad. In addition to the holotype and allotype, six females were deposited in the collection of the Museo de La Plata. These six females were reared by M.R. Trujillo from leaf galls on *Sapium* sp. (Euphorbiaceae) which were collected in

Itusaingó (Corrientes, Argentina) on October 13, 1986. Here we report on the occurrence of *L. gahani* as a parasitoid of *Neolithus fasciatus* Scott (Homoptera: Psyllidae), a gall former on *Sapium biglandulosum*.

Geographic Distribution: Trinidad; Brazil: Minas Gerais; Argentina: Corrientes, Entre Rios, Santa Fe.

Biology and Hosts. *Lochitoencyrtus gahani* is a parasitoid of *N. fasciatus* which induces galls on several organs of its host plant, *S. biglandulosum*. Galls are frequently found on leaves, stems, inflorescences, and fruits (Fig. 1a). In general, galls are spheroid, reddish, and glabrous. When immature, galls are green in color; but during their development the galls turn reddish. Galls were found throughout November to May during the period of study (1980-1983). Gall size was 3.14mm (SD $\pm$



a



b



c



d

Figure 1a:) Galls of *Neolithus fasciatus* (Homoptera: Psyllidae) on several parts of its host plant, *Sapium biglandulosum* (Euphorbiaceae). b) *Neolithus fasciatus* gall. Mature gall splits open and the adult insect emerges. Parasitized galls do not split open as the unparasitized ones. c) Leaf galls of *Trioza* sp. (Homoptera: Psyllidae) on its host plant, *Myrcia itambensis* (Myrtaceae) Scale is 1cm. d) Leaf rachis gall of *Anadiplosis* sp. (Diptera: Cecidomyiidae) on its host plant, *Machaerium aculeatum* (Leguminosae) with a parasitoid larvae in it. Gall diameter is 0.59mm.

3.00mm, $n = 293$), and only one gall former developed in the one-chambered gall ($n = 500$). At the end of the development of the gall, the walls split open and the adult insect emerges for mating (Fig. 1b). Parasitized galls are harder than unparasitized galls and do not split open as easily. Besides *L. gahani*, the psyllid gall former is parasitized by an unidentified species of eurytomid and by an unidentified pteromalid species (Fernandes *et al.* 1988).

Syrphophagus cecidium sp. nov.

Figure 2a, 2b, 2c.

FEMALE: Black; face, pronotum, scutellum, and apical third of the gaster with purple reflections; frontovertex, mesoscutum, and basal third of the gaster with greenish reflections, however stronger in the gaster. Antennae, palpi, trochanters, base and apical third of the forefemora, half basal and apex of the mesofemora, base and apex of the hindfemora, tibiae, tarsi and wing venation yellowish, blackish at the radicle, basal thirds of the pedicel, flagellum, at one sub-basal annulus at the mesotibiae, and at the apical segment of the tarsi. Wings subhyaline, yellowish

Frontovertex reticulate, shallowly punctated at its lateral and posterior regions; mesoscutum also reticulate-punctated; axillae and scutellum with denser reticulation, the latter almost flat and shiny like the gaster; scrobes sub-triangular with rounded edges.

Eyes bare; mesoscutum and scutellum with numerous whitish setae. The distribution of the wing setae is presented in figure 2a.

Head as broad as alitrunk, lenticular, weakly convex; occiput edge sharp; breadths of head and frontovertex at eye level, as follows: 28:9; mandibles broad at their apex, tridentate, maxillary palpi four segmented; labial palpi three segmented; eyes large; cheeks equal to the fourth part of the eyes longitudinal diameter; ocelli in an obtuse triangle, the posterior ones distanced one diameter from the corresponding internal orbits and a little bit less from the edge of the occiput; antennae inserted slightly below the inferior line of the eyes (figure 2b); dimensions of each segment: R 0.052 (0.031) I 0.264 (0.047) II 0.072 (0.041) III 0.052 (0.036) IV 0.057 (0.041) V 0.057 (0.041) VI 0.057 (0.047) VII 0.057 (0.049) VIII 0.057 (0.052) IX 0.062 (0.078) X 0.052 (0.078) XI 0.057 (0.072).

Pronotum conspicuous, mesoscutum broad, entire; axillae slightly separated; scutellum convex; metanotum and propodeum short, spiracles circular. Length of the fore wings 1.473; maximum width 0.572; length of the longer marginal setae 0.041; relative length of the submarginal, marginal, postmarginal, and stigmal veins as follows: 42, 7.5, 5.5, 7. Length of the hind wings 1.029; maximum width 0.254; length of the longer marginal setae 0.057. Middle tibial spurs clearly shorter than the correspondent basitarsi.

Gaster subconic, flattened, shorter than the alitrunk (33:23); the ovipositor originates close to the third basal part and is slightly exerted. Body length is 2mm.

MALE: Frontovertex comparatively broader. Antennae yellowish, but blackish at radicle and at the proximal third of pedicel, as seen in figure 2c; length of each segment: R 0.031; I 0.186, II 0.062; III 0.155; IV 0.114; V 0.109; VI 0.109; VII 0.103; VIII 0.088; IX 0.155. Clava entire. Body length 1.5mm.

GEOGRAPHIC DISTRIBUTION: Brazil: Minas Gerais.

BIOLOGY AND HOSTS: *Syrphophagus cecidium* is a parasitoid of *Trioza* sp. (Homoptera: Psyllidae) which induces leaf galls on *Myrcia itambensis* (Myrtaceae) (Figure 1c). The *Trioza*

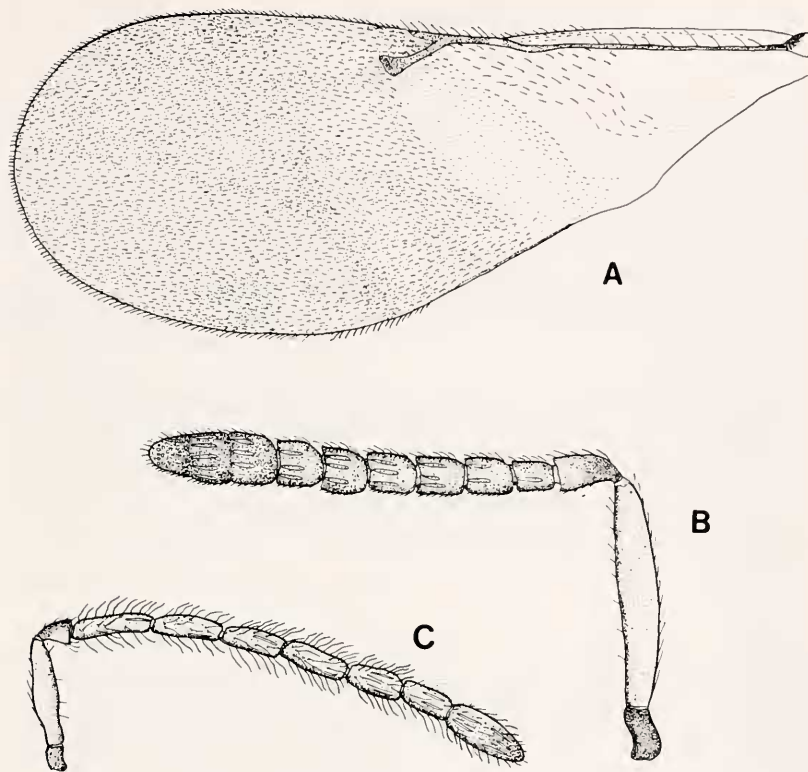


Figure 2: *Syrphophagus cecidium* sp. nov. a) Forewing, female, b) Antenna, female, c) Antenna, male.

sp. leaf galls are greenish, glabrous, unilocular. The average number of galls per leaf is 1.36 ($SD \pm 0.48$, $n = 580$), and the average number of *Trioza* sp. nymphs per gall is 1.33 ($SD \pm 0.57$, $n = 3$). Only the parasitoid *S. cecidium* was present in *Trioza* sp. leaf galls (Fernandes *et al.* 1988).

DIAGNOSIS: Because of forewing venation, head features, and mandible dentition, this new species can not be placed in the genus *Psyllaephagus* Ashmead, 1900. As the host is a Psylloidea (see Noyes & Hayat (1984: 338-339) our new species is included in the genus *Syrphophagus* Ashmead, 1900 near to *S. flavicornis* from which it differs mainly in coloration and antennae shape.

MATERIAL EXAMINED: One female holotype, one male allotype, and one female and two male paratypes; 23.XI.1981, Brazil: Belo Horizonte, G.W. Fernandes. The types are deposited in the collection of the Museo de La Plata, Paseo del Bosque, La Plata, Argentina.

Eurytomidae

Eurytoma minasensis sp. nov.

Figure 3.

FEMALE: Black. Eyes and ocelli reddish. Tegulae and legs, except the coxae, testaceous. Antennae also testaceous, blackish at the radicle, on most of the dorsal face of the pedicel and on the flagellum. Knees, tibiae apices, spurs, tarsi, and wing venations pale yellow. Wings hyaline.

Face with convergent streaks in front of the clypeus. Intervals between the punctation on the head and alitrunk reticulate. Prepectus weakly reticulate at superior third and rugose on the remaining. Propodeum reticulate-rugose with a broad medial depression and one pair of central impressions at the half dorsal part. Structures of urotergite VI weakly impressed.

Body setae whitish; setae on urotergite VI to IX as longer as the body setae.

Antennae with triarticulated clava; dimensions of each segment: R 0.041 (0.044) I 0.264 (0.062) II 0.077 (0.057) annellus 0.008 (0.041) III 0.077 (0.077) IV 0.077 (0.088) V 0.072 (0.077) VI 0.072 (0.083) VII 0.072 (0.093) VIII 0.067 (0.062) IX 0.077 (0.062) X 0.072 (0.062).

Length of the fore wing 1.715, maximum width 0.864; length of the longest marginal setae 0.077; relative length of the submarginal, marginal, postmarginal, and stigmal veins as follows: 60, 17, 13, 11; marginal vein thickened.

Petiole and urotergite IX very short. Gaster in a lateral view, oval, width almost twice its height (70:38). Third urotergite almost as long as the fourth urotergite (16:14). Body length 2.6mm.

MALE: Males are different from the females in the following characters; antennal clavae and fore coxa yellowish; hind femora black except at extremities. Funicular joints short-pedunculate and with long setae, as at the triarticulated clava; segment length as follows: R 0.041 I 0.248 II 0.062 III 0.145 IV 0.139, V 0.129 VI 0.119, VII 0.093 VIII 0.078 IX 0.087. Petiole is of same length as the hind coxae; gaster smaller but not compressed. Body length 2.0mm.



Figure 3: *Eurytoma minasensis* sp. nov., female genitalia.

VARIATIONS: Female paratypes with blackish hind femora.

GEOGRAPHIC DISTRIBUTION: Brazil: Minas Gerais.

BIOLOGY AND HOSTS: *Eurytoma minasensis* is one of the four undescribed chalcidoid wasps reared from *Anadiplosis* sp. (Diptera: Cecidomyiidae) leaf rachis galls on *Machaerium aculeatum* (Leguminosae). Besides the species we describe here, LaSalle (1987) described *Tanaostigmodes fernandesi* (Hymenoptera: Tanaostigmatidae) which is an inquiline of the galls. The other chalcidoids belong to the families Eurytomidae (1), and Platygasteridae (2). The *Anadiplosis* sp. leaf galls are spheroid, green, unilocular, and occur preferentially in clusters [10.05 (SD $\pm$ 10.65 galls per leaf), $n=307$, Fernandes *et al.* 1987, 1988]. Galls have secretory hairs which may trap and kill gall-forming parasitoids. However, only very rarely were *E. minasensis* adults observed trapped by the sticky secretions of the gall's hairs. The galls occur from March throughout December. Only one *Anadiplosis* sp. was found per gall and only one *E. minasensis* was reared per gall (Figure 1d).

DIAGNOSIS: This species runs out couplet 3 in the Bugbee's (1975) key for the *breviura* group of *Eurytoma* species of Mexico and Guatemala. Our species is closely related to *E. subfusca* Bugbee, 1944, but is different in its coloration, in the female genitalia (Figure 3), and in the fourth urotergite which is comparatively short.

MATERIAL EXAMINED: One female holotype, one male allotype, and two female, and one male paratypes; 24.X.1981, Brazil: Belo Horizonte, G.W. Fernandes. The types are deposited in the collection of the Museo de La Plata, Paseo del Bosque, La Plata, Argentina.

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